

DERMATOGLYPHIC PATTERNS IN SCHIZOPHRENIAUday N. Kudalkar¹, N. R. Madhale²¹Associate Professor, Department of Anatomy, Goa Medical College, Bambolim, Goa, India.²Associate Professor, Department of Anatomy, Goa Medical College, Bambolim, Goa, India.**ABSTRACT**

Dermatoglyphic is the scientific study of epidermal ridges and their configuration on the palmar region of hand and the fingers and plantar region of sole and toes. Dermatoglyphic pattern, such as Whorls, Arches, Loops and atd angle have been hypothesized to be indirect measure for early abnormal development process that can lead later psychiatric disorder such as schizophrenia. Under the genetic background of dermatoglyphic patterns and schizophrenia, the study was undertaken to determine the correlation between them. The present study include 63 male and 46 female of schizophrenic patient diagnosed at Institute of Psychiatry and Human Behaviour(IPHB) Hospital, Goa were compared with control group accordingly. The patterns seen on hand and fingers were calculated and compared with the frequency of finger print patterns in control group. It was observed that there is increased frequency of arches and decrease frequency of whorls in control males and females which was significant difference, where as in female schizophrenics there is decrease frequency of radial loop compared to male schizophrenics and significant difference observed in atd angle of right and left hand between female control and female schizophrenics.

KEYWORDS

Dermatoglyphic pattern; Diagnosis; Frequency; Schizophrenia.

HOW TO CITE THIS ARTICLE: Kudalkar UN, Madhale NR. Dermatoglyphic patterns in schizophrenia. J. Evid. Based Med. Healthc. 2016; 3(8), 231-234. DOI: 10.18410/jebmh/2016/55

INTRODUCTION: The term dermatoglyphics was coined by Cummins and Midlo in 1928 and is derived from Greek word 'derma' means skin and 'glyphics' means carving. Dermatoglyphics, epidermal ridges and patterns of the hand, are established by the second trimester and have been considered as marker of prenatal brain injury. The rationale behind this hypothesis is that epidermal ridges share ectodermal origin with the central nervous system. Specifically, epidermal ridges starts to develop in the second gestational week and their critical stage of differentiation occurs in foetal month 3-4, coinciding with a critical phase of brain development P. Rakic, 1988.¹

The morphology of the epidermal ridges is genetically determined but can also be influenced by environmental factors such as viral infection, radiation or alcohol consumption and drug abuse that can disturb brain development. Schaumman BA, 1991 and Bazan and Gerez, 2002.^{2,3} However once they are formed the epidermal ridges remains unchanged. Since both the ridges and brain are derived from the ectoderm, the original ridge characteristics are not disturbed unless the skin is damage to a depth of more than one millimetre thickness.

Many studies have tried to establish the direct link between epidermal ridges and schizophrenia using different parameter to characterize the configuration of epidermal ridges, Fearon et al⁴, reported more than 70 such studies upto 2001, these studies are valuable since they considered

schizophrenia as preventive perspective reflecting an important recent trend in neuroscience. Murthy R.S. and N.N.Wig, 1977, and Fananas L. et al (1990)^{5,6} studied dermatoglyphics in schizophrenia with and without positive history of schizophrenia and found the difference between normal and schizophrenics and was further exaggerated in those with the positive family history.

AIMS AND OBJECTIVES: The aim of the present study was to establish the co-relation between various dermatoglyphic patterns in normal individuals and compared them with those of schizophrenic patients and thus to established the importance of dermatoglyphics as genetic marker, useful investigatory or screening procedure in mentally affected individuals.

MATERIAL AND METHODS: The present study was carried out in the department of Anatomy, Goa Medical College, Bambolim, Goa and Institute of Psychiatric and Human Behaviour (IPHB) hospital, Goa. It include the schizophrenics subjects sample of male 63 and female 46 who reported to the IPHB Hospital out-patient department as well as inpatient department of same hospital who were admitted. A retrospective clinical data collected at the same time as the dermatoglyphic data indicated that most of the subject would met the DSM IV criteria of schizophrenic disorder. Control subjects of male 57 and female 46 were taken from the general population of Goa after excluding the history of any kind of psychiatric ailment either in them or in their first and second degree relatives.

Parameters analyzed were, finger patterns i.e. arches, loops, whorls and atd angle. The method employed for taking the prints of finger and palm was ink and pad method, which is the standard method and relatively quick and

Submission 29-12-2015, Peer Review 30-12-2015,
Acceptance 20-01-2016, Published 28-01-2016.

Corresponding Author:

Dr. Uday N. Kudalkar,
#14, Gomeco-co-op Hsg. Soc. Pvt. Ltd.,
Bambolim, Goa-403202.

E-mail: drkudalkaruday@rediffmail.com

DOI: 10.18410/jebmh/2016/55

inexpensive. The print was taken on the Map Litho White paper as described by Cummins and Midlo. Kores Camel duplicating ink was spread with the help of the roller over a inking slab of size 12"x8" of plain glass. Both the hands were washed with soap and water, the palm and the finger were placed on the inking slab, the smeared palm and fingers of both the hands were kept on the white paper with firm pressure on the dorsum of the hand and the interdigital area.

The fingerprint pattern obtained from such an arches, whorls, loops and atd angle from schizophrenic patient was compared with the controls, the dermatoglyphic pattern on the right and left hand was analyzed according to the sex and subject to statistical test. Whenever difficulties raised in analysing a fingerprint pattern the particular pattern is discarded from the study.

RESULTS:

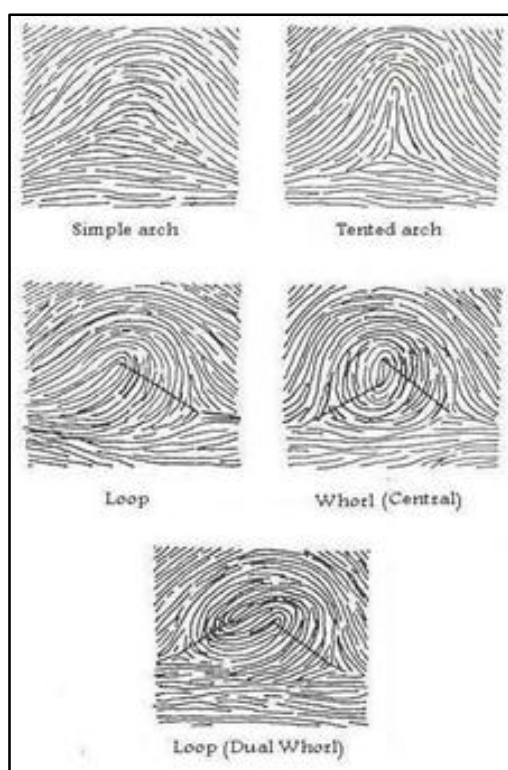


Fig. 1: Total finger print patterns

The frequency of the finger pattern in control male and control female found increased in term with arches in female and whereas decrease frequency of whorls. (Table-1) which is statistically significant ($P < 0.001$). When comparison done between schizophrenic patients according to sex, it was found that there is increased frequency of arch pattern in females and decrease frequency of radial loop pattern, in this finding there is no statistical significance (Table-2). When finger print patterns of schizophrenic male were compared to control male, increased frequency in whorl and radial loop pattern observed in schizophrenic patient which was not significant (Table-3). However when finger pattern of control and schizophrenic female were compared, it was seen that there is decrease frequency of arch patterns in

female affected compared with control, (Table-4) and this study was statistically significant ($P < 0.05$).

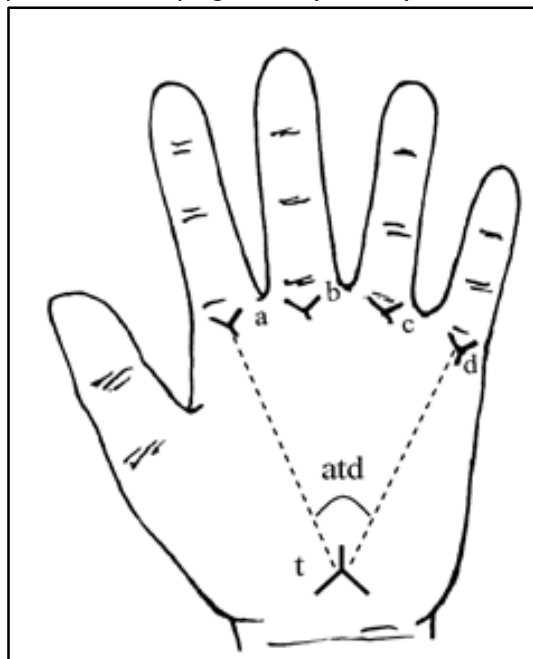


Fig. 2: Axial triradius on the palm (atd angle)

When left hand atd angle of schizophrenic males and females was measured and compared with that of control, significant difference was noticed in female control and female schizophrenic group and also in male and female schizophrenic patients (table-5). However when right hand atd angle was compared, significant difference was observed in female control and female schizophrenic group (table-6)

OBSERVATION:

Pattern	Male N = 57	%	Female N = 46	%
Arches	34	5.96	44	9.56
Loops-U	313	54.91	270	58.69
Loops-R	11	1.92	17	3.6
Whorls	212	37.19	129	28.04
Total	570	100%	460	100%

Table 1: Frequency Distribution Table showing Finger Pattern according to sex in control group

$\chi^2 = 23.89$ Df = 3 $P < 0.001$ (significant).

Pattern	Male N = 63	%	Female N = 46	%
Arches	26	4.12	30	9.52
Loops-U	335	53.17	255	55.43
Loops-R	25	3.96	10	2.17
Whorls	244	38.73	165	35.86
Total	630	100%	460	100%

Table 2: Frequency Distribution Table showing Finger Pattern in schizophrenics according to sex

$\chi^2 = 6.42$ Df = 3 $P > 0.05$ (non-significant)

Pattern	Control N = 57	%	Schizo N = 63	%
Arches	34	5.96	26	4.12
Loops-U	313	54.91	335	53.17
Loops-R	11	1.92	25	3.96
Whorls	212	37.19	244	38.73
Total	570	100%	630	100%

Table 3: Frequency Distribution Table showing Finger Pattern in schizophrenics male & control male

X2 =6.51 Df = 3 P > 0.05 (non-significant).

Pattern	Control N = 46	%	Schizo N = 46	%
Arches	44	9.56	30	6.52
Loops-U	270	58.69	255	55.43
Loops-R	17	3.6	10	2.17
Whorls	129	38.04	165	35.86
Total	460	100%	460	100%

Table 4: Frequency Distribution Table showing Finger Pattern in schizophrenic & control female

X2 = 9.30 Df= 3 P<0.05 (significant)

Group		Number	Mean	SD	t test	P
Control	Male	57	43.193	5.163	2.612	0.10
	Female	46	40.717	4.172		
Schizo	Male	63	41.365	5.023	2.613	0.010
	Female	46	44.173	6.190		

Table 5: Atd angle of Left hand

Group		Number	Mean	SD	t test	P
Control	Male	57	43.087	3.901	1.723	0.012
	Female	46	40.782	5.193		
Schizo	Male	63	41.539	5.732	2.571	0.088
	Female	46	43.434	5.584		

Table 6: Atd angle of Right hand

DISCUSSION: There is possibility that the observation of dermatoglyphics development is associated with a deviation of the normal process of brain development. The dermatoglyphic finding would, therefore, lend indirect support to view that minds abnormalities of brain development, play a role later in life in development of schizophrenia (Murray & Lewis, 1987; Roberts, 1988). Jacob and Beckman (1989),^{7,8} on the basis of neurohistological finding, have claimed that the parahippocampal gyrus is affected by failure of cell migration, during the third to sixth month of foetal development, which is the time when dermal ridges form.

In the present study, in female patients showed decreased frequency of radial loop compared to male schizophrenics, this study supports the finding of Markow & Wandler (1986); Markow & Gottesman (1985)^{9,10} who observed that male schizophrenics have higher level of fluctuating asymmetry than in females. There is also increase in the frequency of whorl pattern and radial loop in schizophrenia than that of control group, this finding also

supports the observation of Varma et al (1996)¹¹ and Sivcov ST et al. (2007)¹² who also observed sex related differences between the schizophrenic patients and the control group of subjects, although it is statistically not significant. Regarding the position of axial triradius, the present finding shows significant difference in atd angle measured in both the hands of schizophrenic patients and compared with the control group. This study is in agreement with the observation of Rohhammer et al. (1971)¹³ as well as Karmarkar and Malhotra (1981)¹⁴ who reported marked difference between patients and control.

CONCLUSION: The present study, as it is based on few palmar dermatoglyphic variable with a small sample size prevents us from making any definite statement as to diagnostic value of the palmar dermatoglyphics in schizophrenia. Results observed in this study however corroborate the previous observation of marked differences in palmar dermatoglyphics between schizophrenic patients and control. Keeping in view the limitations of the present study, finding observed are encouraging. If confirmed with by more detailed studies, these association may be very significant. It is necessary to explore this potential area to widens the scope of dermatoglyphics in schizophrenia.

REFERENCES:

1. Rakic P. Specification of cerebral cortical areas. Science 1988;241:170-176.
2. Schauman BA, Opitz JM. Clinical aspects of dermatoglyphics. Birth Defect Orig Artic Ser. 1991;27(2):193-228.
3. Bazen AM, Gerez SH. Systematic methods for the computation of the directional field and singular point of fingerprints, IEEE, trans. Patt. Mach. Intell 2002; 24(7):905-919.
4. Fearon P, Lans A, Airie M, et al. Is reduced dermatoglyphic a-b ridge count a reliable marker of development impairment in schizophrenia. Schizophr Res 2001;50(3):151-152.
5. Murthy RS, Wig NN. Dermatoglyphics in schizophrenia;The relevance of positive family history. British J. of Psychiatry Jan 1977;130(1):53-8.
6. Fananas L, Moral P, Bertanpetit J. Quantitative dermatoglyphics in schizophrenia: Study of family history sub-groups. Human Biology 1990;62(3):421-7.
7. Murray RM, Lewis SM. Is schizophrenia a neuro-development disorder?. British medical journal 1987;295:681-682.
8. Jacob H, Beckman H. Gross and histological criteria for developmental disorders in the brain of schizophrenics. Journal of the Royal society of Medicine 1989;82(8):466-469.
9. Markow TA, Gottesman II. Fluctuating asymmetry in psychotic twins. Psychiatry Res. 1989;29(1):37-43.
10. Markow TA, Wandler K. Fluctuating dermatoglyphic asymmetry in the genetic of liability to schizophrenia. Psychiatry Research 1986;19:323-328.

11. Varma SZ, Singh S, Azhar MZ. Dermatoglyphics in schizophrenic patients. *Acta Psychiatr Scand* Mar 1995;91(3):213-5.
12. Sivkov ST, Akabaliev VH, Kaleva NN. Comparative dermatoglyphic study of schizophrenic patients: Evidence of the neurodevelopmental model of schizophrenia. *Folia med (Plovdiv)* 2009;51(3):25-30.
13. Rothammer F, Periera G, Comausheight A, et al. Dermatoglyphics in schizophrenic patients *Human Heredity* 1971;21(2):198-202.
14. Karmarkar B, Malhotra KC. Palmar dermatoglyphics in schizophrenia. *Dermatoglyphics* 1981;9:17-29.